REMARKS

Claims 1, 4-28 and 31 are pending in the present application. As will be discussed below, Claim 13 has been amended. No new matter has been added. Accordingly, entry of the present Amendment is requested.

Referring to page 2 of the Office Action, Claims 1, 4-28 and 31 have been rejected under 35 U.S.C. § 112, second paragraph, as assertedly being indefinite.

The following language in Claim 1 is criticized as being indefinite:

> a number average particle size of from 0.1 to 300 μm, and a D_{90}/D_{10} ratio of 5 or less where D_{10} and D_{90} are particle sizes at 10% and 90% accumulation, respectively from the smallest particle size side in a cumulative particle size curve of the particles.

Specifically, it is asserted that Claim 1 is indefinite with respect to the term "number average" and as to what "10% and 90% accumulation" means. The phrase "smallest particle size side in a cumulative particle size curve is also criticized as being indefinite."

Claim 13 has been criticized on the basis that "producing" is a misnomer "since the metal oxide is not being produced by the instantly claimed process but is actually being treated."

Applicants respectfully traverse this rejection for the following reasons.

Applicants respectfully submit that one having ordinary skill in the art would be familiar with the term "number average particle size." Furthermore, the specification at page 19 describes how the number average particle size of the metal oxide powder was measured in the examples. Specifically, a scanning electron microscopic photograph of a metal oxide powder was taken using an electron microscope. From the photograph, 80 to 100 particles were selected and image analyzed to calculate an average value of equivalent circle diameters of the particles

and the distribution. The equivalent circle diameter is a diameter of a circle having the same area as that of each particle in the photograph.

In view of the foregoing, Applicants respectfully submit that the term "number average particle size" is not indefinite.

With regard to the second criticism, when a particle size distribution is measured by a centrifugal sedimentation method or a laser diffraction scattering method, the obtained value is a particle size distribution of the agglomerated particles. *See*, page 15 of the specification. Further, when the particle size distribution measured by such a method is narrow but the powder contains agglomerated particles, the dispersibility is deteriorated, and the powder is not suitable as an industrial raw material. In the present invention, a primary particle size is measured as a number average value and the obtained value is compared with an agglomerated particle size, that is, a particle size at 50% accumulation in a cumulative particle size curve of the particles (D_{50}).

Further, Applicants note that U.S. Patent No. 5,688,480 to Mohri *et al* relied upon by the Examiner in the prior art rejections, discloses a cumulative particle distribution curve.

With respect to the phrase "10% and 90% accumulation," such accumulation can be obtained from a particle size distribution measured with a laser scattering method by measuring the particles sizes of a number of particles and statistically analyzing the particle sizes in, for example, the method described above. Further, D_{10} and D_{90} cannot be determined without deciding whether the accumulation starts from the smallest particle size side or from the largest particle size side of a distribution curve, as would be understood by one skilled in the art.

With regard to the criticism of Claim 13, Applicants have amended this claim to recite "a method for producing a calcined metal oxide powder."

In view of the foregoing clarifying comments and amendment, Applicants respectfully submit that the present claimed invention now more clearly complies with Section 112, second paragraph. Accordingly, withdrawal of this rejection is requested.

Referring to pages 2 and 3 of the Office Action, Claims 1, 4-6 , 11 and 12 have been rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,061,473 to DeCleyn *et al.*

It is asserted that "DeCleyn teaches the claimed rutile titanium dioxide having the claimed particle size and surface area [and] therefore it appears to be substantially identical to that instantly claimed."

Applicants respectfully traverse this rejection for the following reasons.

Applicants respectfully submit that DeCleyn does not teach or suggest the presently claimed D_{10}, D_{90} or a D_{90}/D_{10} ratio.

With regard to an agglomerated particle size and a primary particle size, DeCleyn describes "its primary particle size of 0.5 to 5 μm" and "the agglomerated particles 1 to 100 μm in size" in column 2, lines 30-40. However, DeCleyn does not describe the control of a ratio of an agglomerated particle size to a primary particle size in the range of "from 1 to 6." In fact, the ratios in Examples 1 and 2 of DeCleyn were 26 (13/0.5) and 22.8 (16/0.7), respectively.

It is asserted that the metal oxide of the present invention would have been obvious from DeCleyn. This is only for the reasons that "DeCleyn teaches the claimed rutile dioxide having the claimed particle size and surface area." However, Applicants respectfully submit that there

are a number of parameters to define particles. Among them, the present inventors have selected D_{10}, D_{90} and a D_{90}/D_{10} ratio and a ratio of an agglomerated particle size to a primary particle size and found the specific ranges for these parameters to provide a metal oxide powder having a small particle size, a uniform particle size distribution and a uniform particle shape and containing fewer agglomerates, which is suitable for various applications.

DeCleyn discloses rutile titanium dioxide suitable "as an opacifier for vitreous enamel and fusion enamels" (column 2, lines 9-12), and DeCleyn does not describe the effects achieved by the present invention.

Furthermore, DeCleyn does not describe or teach the calcination of a metal oxide powder or a metal oxide precursor powder in a halogen-containing atmosphere, as recited in method Claim 13.

In view of the foregoing, Applicants respectfully submit that the present claimed invention would not have been *prima facie* obvious from DeCleyn. Accordingly withdrawal of this rejection is requested.

Claims 1, 4-6 and 11-28 have been rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 4,517,163 to Jodden *et al.* Additionally, Claims 1, 4-8, 11-28 and 31 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,465,656 to Pastor *et al.*

It is asserted that since each of Jodden and Pastor "teaches the instantly claimed process, the instantly claimed product would also necessarily be formed.

Jodden relates to a process for making titanium dioxide concentrates by removing iron from material containing titanium oxide and iron oxides, while the present application provides a

method for producing a metal oxide powder having a narrow particle size distribution from a metal oxide powder or a metal oxide precursor powder. In the present invention, the metal oxide powder or metal oxide precursor powder used as a raw material is the same oxide as the metal oxide having the narrow particle size distribution to be produced. As discussed in the specification, the metal oxide precursor is "a material which gives the metal oxide consisting of the single metal and oxygen by a decomposition reaction or an oxidation reaction in calcination" (page 7, lines 4-1 from the bottom of the present specification). The present invention does not require a raw material containing titanium oxide and a relatively large amount, for example, 32% of iron as used in the Examples of Jodden.

In addition, Jodden teaches that the particle size of the raw material containing titanium oxide is preferably from "20 to 1000 μm" and the particle size of the comminuted product is preferably from "60 to 600 μm" (column 1, lines 48-58). In the present invention, the metal oxide powder used as a raw material preferably has an average particle size of "0.1 μm or less" (page 8, lines 7-8 of the specification).

Accordingly, Applicants respectfully submit that it cannot necessarily be concluded that the metal oxide produced by the process of Jodden might have the same particle size as that claimed in the present application, only because the process of Jodden would be similar to the process of present invention. Rather, Jodden describes the use of raw material having a much larger particle size than that of the raw material used in the present invention. From this difference of the particle sizes of the raw materials, the titanium dioxide of Jodden should be far different from the metal oxide of the present invention having a small particle size, a uniform particle size distribution and a uniform particle shape containing fewer agglomerates.

Further, Jodden does not teach or suggest the presently claimed D_{10}, D_{90}, D_{90}/D_{10} ratio and ratio of an agglomerated particle size to a primary particle size.

Accordingly, Applicants respectfully submit that the present claimed invention also would not have been *prima facie* obvious from Jodden.

In view of the foregoing, Applicants respectfully submit that the present claimed invention would not have been *prima facie* obvious from Jodden and/or Pastor. Accordingly, withdrawal of these rejections is requested.

Pastor discloses a process for the preparation of a water-free oxide of silicon or germanium. Pastor reacts "a nonpolar chloride compound containing said silicon or germanium with dimethyl sulfoxide to form a precipitate containing said oxide." Applicants respectfully submit that this process is entirely different from the process of the present invention.

It is asserted that "Pastor teaches the claimed process of calcining titanium oxide, zirconium oxide or precursor thereof in an atmosphere of halogen gas (*see*, the examples and claims)." However, neither the claims nor the examples of Pastor describe "titanium oxide, zirconium oxide or precursor thereof."

In addition, Pastor does not teach or suggest the presently claimed D_{10}, D_{90}, D_{90}/D_{10} ratio and ratio of an agglomerated particle size to a primary particle size.

Accordingly, Applicants respectfully submit that the present claimed invention also would not have been *prima facie* obvious from Pastor.

In view of the foregoing, Applicants respectfully submit that the present claimed invention would not have been *prima facie* obvious from Jodden and/or Pastor. Accordingly, withdrawal of these rejections is requested.

Claims 1, 4-28 and 31 have been rejected on obviousness-type double patenting grounds as being unpatentable over each of Claims 1-11 of U.S. Patent No. 6,303,091 to Mohri *et al.*, Claims 1-6 of U.S. Patent No. 5,736,111 to Saegusa, Claims 1-23 of U.S. Patent No. 5,688,480 to Mohri *et al.*, Claims 1-6 of U.S. Patent No. 5,840,267 to Saegusa, and Claims 1-7 of U.S. Patent No. 5,846,505 to Saegusa.

It is simply indicated with regard to each of these patents that "it would have been obvious to recover the instantly claimed product from the taught process."

Applicants respectfully traverse these rejections for the following reasons.

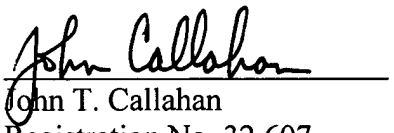
First, all of the claims of the cited references are method type claims. In contrast, Claims 1 and 4-12 of the present application recite a metal oxide powder. The Examiner has not set forth any basis for asserting that the embodiment of the present claimed invention relating to the powder would have been *prima facie* obvious from the claims of the cited references, as required in this type of a rejection. Second, Applicants respectfully submit that in any event, the claims of the cited references do not teach, suggest or appreciate the advantages of at least the presently claimed ratio of agglomerated particle size to primary particle size of from 1 to 6.

Accordingly, withdrawal of the rejections is requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

13. (Amended) A method for producing a calcined metal oxide powder having a narrow particle size distribution except α-alumina, comprising calcining a metal oxide powder or a metal oxide precursor powder in the presence or absence of a seed crystal in an atmosphere containing at least one gas selected from the group consisting of (1) a hydrogen halide, (2) a component prepared from a molecular halogen and steam and (3) a molecular halogen.